

CLAIMS

1. A color forming composition, comprising:

a) a leuco dye;

5 b) an infrared absorber admixed with or in thermal contact with the leuco dye; and

c) a stabilizer selected from the group consisting of chroman, thiolane-nickel complex, spiroindane, and mixtures thereof, wherein said stabilizer is admixed with or overprinted with respect to the infrared absorber.

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2. The composition of claim 1, wherein the stabilizer is selected from the group consisting of bis(4-dimethylaminodithiobenzil)nickel; tetrabutyl-phosphonium (SP-4-1)-bis[4,5-di(mercapto- κ S)-1,3-dithiole-2-thionato(2-)]nickelate(1-) (9CI); 1,1'-spirobi[1H-indene]-5,5',6,6'-tetrol-2,2',3,3'-tetrahydro-
15 3,3,3',3'-tetramethyl- (9CI); 1,1'-spirobi[1H-indene]-2,2',3,3'-tetrahydro-3,3,3',3'-tetramethyl-5,5',6,6'-tetrapropoxy- (9CI); chroman; and mixtures thereof.

3. The composition of claim 2, wherein the stabilizer is chroman, said stabilizer configured for both stabilizing the infrared absorber and inhibiting
20 oxidation of the leuco dye.

4. The composition of claim 1, wherein the infrared absorber is selected from the group consisting of pyrimidinetrione-cyclopentylidenes, guaiazulenyl dyes, croconium dyes, and mixtures thereof.

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5. The composition of claim 4, wherein the infrared absorber is selected from the group consisting of pyrimidinetrione-cyclopentylidene and guaiazulenyl dye and the stabilizer is selected from the group consisting of chroman and nickel dithiolane complex.

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6. The composition of claim 5, wherein the infrared absorber is selected from the group consisting of 2,4,6(1H,3H,5H)-pyrimidinetrione 5-[2,5-bis[(1-ethyl-

- 1,3-dihydro-1,1,3-dimethyl-2H-indol-2-ylidene)ethylidene]cyclopentylidene]-1,3-dimethyl- (9CI); methanaminium N-[5-[3-[5-(dimethylamino)-2-thienyl]-2-hydroxy-4,5-dioxo-2-cyclopenten-1-ylidene]-2(5H)-thienylidene]-N-methyl- inner salt (9CI); cyclobutenediylum 1,3-bis[3,8-dimethyl-5-(1-methylethyl)-1-azulenyl]-2,4-dihydroxy- bis(inner salt) (9CI); and mixtures thereof.

7. The composition of claim 1, wherein the color forming composition is optimized for development using infrared radiation having a wavelength of from about 750 nm to about 900 nm.
8. The composition of claim 1, wherein the leuco dye is selected from the group consisting of fluorans, phthalides, amino-triarylmethanes, aminoxanthenes, aminothioxanthenes, amino-9,10-dihydro-acridines, aminophenoxazines, aminophenothiazines, aminodihydro-phenazines, aminodiphenylmethanes, aminohydrocinnamic acids and corresponding esters, 2(p-hydroxyphenyl)-4,5-diphenylimidazoles, indanones, leuco indamines, hydrozines, leuco indigoid dyes, amino-2,3-dihydroanthraquinones, tetrahalo-p,p'-biphenols, 2(p-hydroxyphenyl)-4,5-diphenylimidazoles, phenethylanilines, and mixtures thereof.
9. The composition of claim 1, further comprising an anti-oxidant selected from the group consisting of vitamin E, vitamin E analogs, astaxanthin, ascorbic acid, carotene, and mixtures thereof.
10. A color forming composition, comprising:
- a) a leuco dye;
 - b) an infrared absorber admixed with or in thermal contact with the leuco dye; and
 - c) an anti-fade agent selected from the group consisting of chroman, vitamin E, vitamin E analogs, astaxanthin, ascorbic acid, carotene, and mixtures thereof, wherein said anti-fade agent is admixed with the leuco dye.

11. The composition of claim 10, wherein the anti-fade agent is selected from the group consisting of chroman, vitamin E, vitamin E analogs, astaxanthin, and mixtures thereof.
- 5 12. The composition of claim 11, wherein the anti-fade agent is chroman.
13. The composition of claim 11, wherein said leuco dye is a fluoran.
14. The composition of claim 10, wherein the leuco dye is selected from
10 the group consisting of fluorans, phthalides, amino-triarylmethanes, aminoxanthenes, aminothioxanthenes, amino-9,10-dihydro-acridines, aminophenoxazines, aminophenothiazines, aminodihydro-phenazines, aminodiphenylmethanes, aminohydrocinnamic acids and corresponding esters, 2(p-hydroxyphenyl)-4,5-diphenylimidazoles, indanones, leuco indamines,
15 hydrazines, leuco indigoid dyes, amino-2,3-dihydroanthraquinones, tetrahalo-p,p'-biphenols, 2(p-hydroxyphenyl)-4,5-diphenylimidazoles, phenethylanilines, and mixtures thereof.
15. The composition of claim 10, wherein the infrared absorber is selected
20 from the group consisting of pyrimidinetrione-cyclopentylidenes, guaiazulenyl dyes, croconium dyes, and mixtures thereof.
16. The composition of claim 10, wherein the color forming composition is spin-coatable.
- 25 17. An optical disk, comprising an optical disk substrate having a color forming composition coated thereon, said color forming composition including:
- a) a leuco dye;
 - b) an infrared absorber admixed with or in thermal contact with the
30 leuco dye; and
 - c) a stabilizer in optical proximity with the infrared absorber, said stabilizer configured for stabilizing the infrared absorber.

18. The optical disk of claim 17, wherein the stabilizer is selected from the group consisting of chroman, thiolane-nickel complex, spiroindane, and mixtures thereof.

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19. The optical disk of claim 18, wherein the stabilizer is chroman.

20. The optical disk of claim 17, wherein the infrared absorber is selected from the group consisting of pyrimidinetrione-cyclopentylidenes, guaiazulenylyl dyes, croconium dyes, and mixtures thereof.

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21. The optical disk of claim 20, wherein the infrared absorber is a croconium dye.

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22. The optical disk of claim 17, wherein the infrared radiation absorber is pyrimidinetrione-cyclopentylidene and guaiazulenylyl dye and the stabilizer is selected from the group consisting of chroman and nickel dithiolane complex.

23. The optical disk of claim 17, wherein said color forming composition is optimized for development using infrared radiation having a wavelength of from about 760 nm to about 850 nm.

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24. The optical disk of claim 17, wherein the stabilizer is admixed with or layered over the infrared absorber.

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25. An optical disk, comprising an optical disk substrate having a color forming composition coated thereon, said color forming composition including:

- a) a leuco dye;
- b) an infrared absorber admixed with or in thermal contact with the leuco dye; and
- c) an anti-fade agent admixed with the leuco dye, said anti-fade agent configured for inhibiting oxidation of the leuco dye.

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26. The optical disk of claim 25, wherein the anti-fade agent is selected from the group consisting of chroman, vitamin E, vitamin E analogs, astaxanthin, ascorbic acid, carotene, and mixtures thereof.

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27. The optical disk of claim 26, wherein the anti-fade agent is chroman.

28. The optical disk of claim 25, wherein the leuco dye is selected from the group consisting of fluorans, phthalides, amino-triarylmethanes, aminoxanthenes, aminothioxanthenes, amino-9,10-dihydro-acridines, aminophenoxazines, aminophenothiazines, aminodihydro-phenazines, aminodiphenylmethanes, aminohydrocinnamic acids and corresponding esters, 2(p-hydroxyphenyl)-4,5-diphenylimidazoles, indanones, leuco indamines, hydrozines, leuco indigoid dyes, amino-2,3-dihydroanthraquinones, tetrahalo- p,p'-biphenols, 2(p-hydroxyphenyl)-4,5-diphenylimidazoles, phenethylanilines, and mixtures thereof.

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29. The optical disk of claim 28, wherein the leuco dye is a fluoran.

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30. The optical disk of claim 29, wherein the anti-fade agent is chroman.

31. The optical disk of claim 25, wherein said color forming composition is optimized for development using infrared radiation having a wavelength of from about 760 nm to about 850 nm.

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32. A method of forming color images on an optical disk substrate, comprising:

a) applying a color forming composition onto an optical disk substrate, said color forming composition including:

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- i) a leuco dye;
- ii) an infrared absorber admixed with or in thermal contact with the leuco dye; and

- iii) at least one of a stabilizer and an anti-fade agent, said stabilizer being configured for stabilizing the infrared absorber and said anti-fade agent being configured for inhibiting oxidation of the leuco dye; and
- 5 b) applying infrared radiation to the color forming composition sufficient to cause reduction of the leuco dye without decomposing the color forming composition.

33. The method of claim 32, wherein said stabilizer is a member selected
10 from the group consisting of chroman, thiolane-nickel complex, spiroindane, and mixtures thereof.

34. The method of claim 33, wherein said color forming composition
includes a stabilizer such that the color forming composition exhibits a change in
15 optical density of less than about 30% over a period of at least three years.

35. The method of claim 32, wherein said infrared absorber is selected
from the group consisting of pyrimidinetrione-cyclopentylidenes, guaiazuleny
dyes, croconium dyes, and mixtures thereof.

20 36. The method of claim 32, wherein said color forming composition
includes the anti-fade agent such that the color forming composition exhibits a
change in optical density of less than about 20% over a period of at least three
years.

25 37. The method of claim 36, wherein said anti-fade agent is a member
selected from the group consisting of chroman, vitamin E, vitamin E analogs,
astaxanthin, ascorbic acid, carotene, and mixtures thereof.

30 38. The method of claim 32, wherein the leuco dye is a fluoran.

39. The method of claim 32, wherein the infrared radiation is applied at from about 0.3 J/cm² to about 0.5 J/cm².

40. The method of claim 32, wherein the infrared radiation is applied for
5 about 100 μ sec to about 500 μ sec.

41. The method of claim 32, wherein the infrared radiation is applied using an infrared laser having a wavelength of about 780 nm.

10 42. The method of claim 32, wherein the infrared radiation has a spot size from about 10 μ m to about 60 μ m.

43. The system of claim 32, wherein the infrared radiation is at a power level from about 30 mW and about 50 mW.

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44. The method of claim 32, wherein the infrared absorber is a member selected from the group consisting of polymethine dyes, polymethyl indolium dyes, metal complex IR dyes, cyanine dyes, indocyanine green, squarylium dyes, chalcogenopyrrolylidene dyes, croconium dyes, metal thiolate dyes,
20 bis(chalcogenopyrrolyl)polymethine dyes, oxyindolizine dyes, bis(aminoaryl)polymethine dyes, merocyanine dyes, indolizine dyes, pyrylium dyes, quinoid dyes, and mixtures thereof.

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